

WHAT IS CLAIMED IS:

1. A method for forming a strain-relaxed SiGe layer on a substrate comprising:  
depositing a reverse graded strained SiGe layer onto a substrate, the reverse graded SiGe layer having a lower surface in contact with the substrate and an upper surface, wherein a first Ge concentration at the lower surface is greater than a second Ge concentration at the upper surface; and  
oxidizing the reverse graded SiGe film to produce a strain-relaxed SiGe layer.
2. The method of Claim 1, wherein the substrate comprises a single-crystal silicon substrate.
3. The method of Claim 2, wherein the substrate further comprises an epitaxial silicon layer.
4. The method of Claim 1, wherein the substrate is an SOI substrate.
5. The method of Claim 1, wherein the first Ge concentration is in the range of about 20 atomic % to about 50 atomic % prior to oxidizing.
6. The method of Claim 5, wherein the first Ge concentration is about 40 atomic % prior to oxidizing.
7. The method of Claim 1, wherein the second Ge concentration is in the range of about 0 atomic % to about 10 atomic % prior to oxidizing.
8. The method of Claim 7, wherein the second Ge concentration is about 0 atomic % prior to oxidizing.
9. The method of Claim 1, wherein after oxidizing the Ge concentration in the strain-relaxed SiGe layer varies by less than about 5% between the lower surface and the upper surface.
10. The method of Claim 1, wherein oxidizing comprises exposing the reverse graded SiGe film to an oxidizing agent.
11. The method of Claim 10, wherein the oxidizing agent is selected from the group consisting of water and oxygen.
12. A method of forming a strained silicon layer on a substrate comprising:  
depositing a strained SiGe layer comprising a top and a bottom on the substrate, wherein the SiGe layer comprises a reverse graded Ge concentration;

oxidizing the strained SiGe layer thereby forming a silicon oxide layer over a strain-relaxed SiGe layer;

removing the oxide; and

depositing a strained silicon layer over the strain relaxed SiGe layer.

13. The method of Claim 12, wherein the substrate is a bulk silicon wafer.

14. The method of Claim 13, wherein the substrate further comprises an epitaxial silicon layer.

15. The method of Claim 12, wherein the substrate is an SOI substrate.

16. The method of Claim 12, wherein the Ge concentration increases from the top to the bottom prior to oxidizing.

17. The method of Claim 12, wherein oxidizing comprises exposing the substrate to an oxidizing agent

18. The method of Claim 17, wherein the substrate is exposed to an oxidizing agent at a temperature between about 850°C and about 1150°C.

19. The method of Claim 17, wherein the substrate is exposed to an oxidizing agent at a temperature greater than about 1000°C.

20. The method of Claim 17, wherein the oxidizing agent is selected from the group consisting of water and oxygen.

21. The method of Claim 12, wherein oxidizing comprises dry oxidation.

22. The method of Claim 12, wherein oxidizing comprises wet oxidation.

23. The method of Claim 12, wherein removing the oxide comprises wet etching.

24. A method for forming a strain-relaxed SiGe layer on a substrate comprising:

depositing a strained SiGe layer onto a substrate, the SiGe layer having a lower surface in contact with the substrate and an upper surface, wherein a first Ge concentration at the lower surface is greater than a second Ge concentration at the upper surface; and

oxidizing the SiGe film to produce a strain-relaxed SiGe layer wherein the concentration of Ge is highest at the lower surface.

25. The method of Claim 24, wherein the Ge concentration decreases linearly from the first concentration to the second concentration prior to oxidizing.